

**PCT**WORLD INTELLECTUAL PROPERTY ORGANIZATION  
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## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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(54) Title: PROCESS FOR SEQUENTIALLY APPLYING SAGD TO ADJACENT SECTIONS OF A PETROLEUM RESERVOIR			
(57) Abstract <p>Steam assisted gravity drainage ("SAGD") is practised in a first section of a reservoir containing heavy oil. When production becomes uneconomic, steam injection into the first section is terminated. Non-condensable gas is then injected into the section to pressurize it and production of residual oil and steam condensate is continued. Concurrently with pressurization, SAGD is practised in an adjacent reservoir section. As a result, some of the residual oil in the first section is recovered and steam loss from the second section to the first section is minimized.</p>			

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1           **PROCESS FOR SEQUENTIALLY APPLYING SAGD TO ADJACENT**  
2           **SECTIONS OF A PETROLEUM RESERVOIR**

3

4           **FIELD OF THE INVENTION**

5           This invention relates to recovering heavy oil from an underground  
6           reservoir using a staged process involving, in the first stage, steam assisted  
7           gravity drainage, and in the second stage, non-condensable gas injection and  
8           reservoir pressurization.

9

10           **BACKGROUND OF THE INVENTION**

11           Steam assisted gravity drainage ("SAGD") is a process first proposed  
12          by R. M. Butler and later developed and tested at the Underground Test  
13          Facility ("UTF") of the Alberta Oil Sands Technology and Research Authority  
14          ("AOSTRA"). The SAGD process was originally developed for use in heavy  
15          oil or bitumen containing reservoirs, (hereinafter collectively referred to as  
16          'heavy oil reservoirs'), such as the Athabasca oil sands. The process, as  
17          practised at the UTF, involved:

18           • Drilling a pair of horizontal wells close to the base of the reservoir  
19           containing the heavy oil. One well was directly above the other in  
20           relatively close, co-extensive, spaced apart, parallel relationship.  
21           The wells were spaced apart 5 – 7 meters and extended in parallel  
22           horizontal relationship through several hundred meters of the oil  
23           pay or reservoir;

1           • Then establishing fluid communication between the wells so that  
2           fluid could move through the span of formation between them. This  
3           was done by circulating steam through each of the wells to produce  
4           a pair of "hot fingers". The span between the wells warmed by  
5           conduction until the contained oil was sufficiently heated so that it  
6           could be driven by steam pressure from one well to the other. The  
7           viscous oil in the span was replaced with steam and the wells were  
8           then ready for production;

9           • Then converting to SAGD production. More particularly, the upper  
10          well was used to inject steam and the lower well was used to  
11          produce a product mixture of heated oil and condensed water. The  
12          production well was operated under steam trap control. That is, the  
13          production well was throttled to maintain the production temperature  
14          below the saturated steam temperature corresponding to the  
15          production pressure. Otherwise stated, the fluids being produced at  
16          the production interval should be at undersaturated or "subcooled"  
17          condition. (Subcool = steam temperature corresponding to the  
18          measured producing production pressure – measured temperature.)  
19          This was done to ensure a column of liquid over the production well,  
20          to minimize "short-circuiting" by injected steam into the production  
21          well. The injected steam began to form an upwardly enlarging  
22          steam chamber in the reservoir. The chamber extended along the  
23          length of the horizontal portions of the well pair. Oil that had  
24          originally filled the chamber sand was heated, to mobilize it, and

1                   drained, along with condensed water, down to the production well,  
2                   through which they were removed. The chamber was thus filled  
3                   with steam and was permeable to liquid flow. Newly injected steam  
4                   moved through the chamber and supplied heat to its peripheral  
5                   surface, thereby enlarging the chamber upwardly and outwardly as  
6                   the oil was mobilized and drained together with the condensed  
7                   water down to the production well.

8    This process is described in greater detail in Canadian patent 1,304,287  
9    (Edmunds, Haston and Cordell).

10                  The process was shown to be commercially viable and is now being  
11                  tested by several oil companies in a significant number of pilot projects.

12                  Now, the operation of a single pair of wells practising SAGD has a finite  
13                  life. When the upwardly enlarging steam chamber reaches the overlying, cold  
14                  overburden, it can no longer expand upwardly and heat begins to be lost to  
15                  the overburden. If two well pairs are being operated side by side, their  
16                  laterally expanding chambers will eventually contact along their side edges  
17                  and further oil-producing lateral expansion comes to a halt as well. As a  
18                  result, oil production rate begins to drop off. As a consequence of these two  
19                  occurrences, the steam/oil ratio ("SOR") begins to rise and continued SAGD  
20                  operation with the pair eventually becomes uneconomic.

21                  If one considers two side-by-side SAGD well pairs which have been  
22                  produced to "maturity", as just described, it will be found that a ridge of  
23                  unheated oil is left between the well pairs. It is of course desirable to  
24                  minimize this loss of unrecovered oil.

1        In Canadian patent 2,015,460 (Kisman), assigned to the present  
2        assignee, there is described a technique for limiting the escape of steam into  
3        a thief zone. For example, if steam is being injected into a relatively  
4        undepleted reservoir section and there is a nearby more depleted reservoir  
5        section, forming a low pressure sink, there is a likelihood that pressurized  
6        steam will migrate from the undepleted section into the more depleted section  
7        – which is an undesired result. One wants to confine the steam to the  
8        relatively undepleted section where there is lots of oil to be heated, mobilized  
9        and produced. The Kisman patent teaches injecting a non-condensable gas,  
10       such as natural gas, into the more depleted section to raise its pressure and  
11       equalize it with the pressure in the relatively undepleted section. By this  
12       means, the loss of steam from the one section to the other can be curtailed or  
13       minimized.

14       The Kisman patent further teaches that pressurizing the more depleted  
15       section with natural gas has been characterized by an increase in production  
16       rate from that section, if the production well penetrating the section is  
17       produced during pressurization.

#### SUMMARY OF THE INVENTION

19       In accordance with the present invention, a novel process is provided  
20       for producing adjacent sections of an underground reservoir containing heavy  
21       oil. Each section is penetrated by one or more wells completed for SAGD  
22       operation, preferably one or more pairs of horizontal injection and production  
23       wells. The process comprises:



1        The process provides a strategy for sequentially producing adjacent  
2    sections across the reservoir. It takes advantage of gas pressurization to  
3    prevent steam leakage from a less depleted section undergoing SAGD to a  
4    mature, more depleted section. It also maximizes production from each  
5    section by subjecting it to sequential SAGD and pressurization production  
6    stages.

7

8        **DESCRIPTION OF THE PREFERRED EMBODIMENT**

9        In accordance with the best mode of the process known to the  
10   applicants, it comprises:

11        (a) directionally drilling one or more pairs of wells from ground  
12    surface into a reservoir first section, to provide generally parallel,  
13    horizontal, co-extensive, spaced apart, upper and lower well  
14    portions extending through the section, and completing the wells  
15    for SAGD production;

16        (b) establishing fluid communication between the injection and  
17    production wells of each pair, for example by circulating steam  
18    through both wells, to heat the span between the wells by heat  
19    conduction, and then displacing and draining the oil in the span  
20    by injecting steam through the upper injection well and opening  
21    the lower production well for production;

1 (c) practising SAGD in the reservoir first section by injecting steam  
2 through the injection wells and producing the produced heated  
3 oil and condensed water through the production wells while  
4 operating said production wells under steam trap control;

5 (d) preparing a second adjoining section of the reservoir for SAGD  
6 production by carrying out the provision of wells and establishing  
7 fluid communication between the wells of each pair as in steps  
8 (a) and (b);

9 (e) terminating or reducing steam injection into the reservoir first  
10 section injection wells and initiating natural gas injection through  
11 said injection wells to increase the pressure in the reservoir first  
12 section to about the anticipated steam injection pressure in the  
13 reservoir second section and maintaining the pressure at about  
14 this level while simultaneously producing residual heated oil and  
15 steam condensate through the production wells under steam  
16 trap control; and

17 (f) concurrently with step (e), practising SAGD in the reservoir  
18 second section.

19 In connection with practising steam trap control with wells extending  
20 down from ground surface and having riser and horizontal production  
21 sections, it is preferred to operate as follows:

22 • measuring the downhole temperature at the injection and  
23 production wells of an operating pair, using thermocouples;

1           • establishing the temperature differential between the two wells and  
2           throttling the production well to maintain the differential at a  
3           generally constant value (say 7°);  
4           • monitoring for significant surges in vapour production rate at the  
5           ground surface production separator and for surges in steam  
6           injection rate; and  
7           • adjusting throttling to minimize the surges.

8       Otherwise stated, a generally constant liquid rate at the wellhead is  
9       maintained and the bottomhole production temperature is allowed to vary  
10      within a limited range.

11      The invention is characterized by the following advantages:

12           • additional oil is recovered from the mature wells during the gas  
13           pressurization stage, while simultaneously reducing steam leakage  
14           from the second reservoir section;  
15           • use is made of the residual heat left in the mature reservoir section;  
16           and  
17           • a finite steam-producing plant can be applied in sequence to a  
18           plurality of adjacent sections of the reservoir, without severe steam  
19           loss from a section undergoing SAGD to an adjacent depleted  
20           section.

1        THE EMBODIMENTS OF THE INVENTION IN WHICH AN  
2        EXCLUSIVE PROPERTY OR PRIVILEGE IS CLAIMED ARE DEFINED AS  
3        FOLLOWS:

4        1. A method for recovering heavy oil from an underground reservoir,  
5        comprising:

6            (a) injecting steam and producing heated oil and steam condensate  
7        by steam assisted gravity drainage ("SAGD") in a first section of the reservoir  
8        until it is substantially uneconomic to continue doing so;

9            (b) preparing an adjoining section of the reservoir for SAGD;

10          (c) terminating or reducing steam injection into the reservoir first  
11        section;

12          (d) injecting steam and producing heated oil and steam condensate  
13        by SAGD in an adjacent second section of the reservoir; and

14            (e) concurrently with step (d), injecting a non-condensable gas into  
15        the first section to pressurize it and producing residual oil and steam  
16        condensate from said first section.

17

18        2. The method as set forth in claim 1 wherein:

19            the first section is pressurized in step (e) to a pressure about equal with  
20        the steam injection pressure in step (d).

## INTERNATIONAL SEARCH REPORT

Application No  
PCT/CA 99/00996A. CLASSIFICATION OF SUBJECT MATTER  
IPC 7 E21B43/24

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)  
IPC 7 E21B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the International search (name of data base and, where practical, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	CA 2 015 460 C (KISMAN KENNETH E) 26 October 1991 (1991-10-26) cited in the application page 4, line 6 - line 18 page 9, line 7 - line 18	1,2
Y	GB 1 463 444 A (SHELL INTERNATIONALE RESEARCH MAATSHAPPIJ) 2 February 1977 (1977-02-02) page 1, line 63 - line 92	1,2
A	US 4 903 768 A (SHU PAUL) 27 February 1990 (1990-02-27) column 2, line 44 - line 61	1

 Further documents are listed in the continuation of box C. Patent family members are listed in annex.

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Date of the actual completion of the International search

17 January 2000

Date of mailing of the International search report

28/01/2000

Name and mailing address of the ISA

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## INTERNATIONAL SEARCH REPORT

Application No  
PCT/CA 99/00996

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 4 166 504 A (BROWN ALFRED ET AL) 4 September 1979 (1979-09-04) column 1, line 49 - line 65 column 2, line 66 -column 3, line 16	1
A	US 5 318 124 A (ONG TEE S ET AL) 7 June 1994 (1994-06-07)	1

## INTERNATIONAL SEARCH REPORT

Information on patent family members

b. International Application No

PCT/CA 99/00996

Patent document cited in search report		Publication date		Patent family member(s)		Publication date
CA 2015460	C	14-12-1993	CA	2015460 A		26-10-1991
GB 1463444	A	02-02-1977	CA	1026668 A		21-02-1978
US 4903768	A	27-02-1990	CA	2006967 A,C		03-07-1990
US 4166504	A	04-09-1979	BR	7905405 A		29-04-1980
			CA	1102684 A		09-06-1981
			DE	2930143 A		06-03-1980
US 5318124	A	07-06-1994	CA	2055549 A		15-05-1993
			DE	4238247 A		19-05-1993
			RU	2098613 C		10-12-1997

## PATENT COOPERATION TREATY

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## INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference <b>1024.106</b>	<b>FOR FURTHER ACTION</b>	see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, Item 5 below.
International application No. <b>PCT/CA 99/00996</b>	International filing date ( <i>day/month/year</i> ) <b>26/10/1999</b>	(Earliest) Priority Date ( <i>day/month/year</i> ) <b>26/10/1998</b>
Applicant <b>ALBERTA OTL SANDS TECHNOLOGY AND...et al.</b>		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of **3** sheets.

It is also accompanied by a copy of each prior art document cited in this report.

## 1 Basis of the report

a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing:

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filed together with the international application in computer readable form.

furnished subsequently to this Authority in written form.

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the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

**Certain claims were found unsearchable** (See Box I).

**Unity of invention is lacking** (see Box II).

#### 1 With regard to the title

the text is approved as submitted by the applicant.  
 the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,

the text is approved as submitted by the applicant.

the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the drawings to be published with the abstract is Figure No.

- as suggested by the applicant.
- because the applicant failed to suggest a figure.
- because this figure better characterizes the invention.

None of the figures

## INTERNATIONAL SEARCH REPORT

International Application No  
PCT/CA 99/00996A. CLASSIFICATION OF SUBJECT MATTER  
IPC 7 E21B43/24

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)  
IPC 7 E21B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

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Date of the actual completion of the international search	Date of mailing of the international search report
17 January 2000	28/01/2000

Name and mailing address of the ISA  
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NL - 2280 HV Rijswijk  
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Fax: (+31-70) 340-3016

Authorized officer

Garrido Garcia, M

## INTERNATIONAL SEARCH REPORT

International Application No  
PCT/CA 99/00996

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 4 166 504 A (BROWN ALFRED ET AL) 4 September 1979 (1979-09-04) column 1, line 49 - line 65 column 2, line 66 -column 3, line 16 -----	1
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## INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/CA 99/00996

Patent document cited in search report		Publication date		Patent family member(s)		Publication date
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GB 1463444	A	02-02-1977	CA	1026668 A		21-02-1978
US 4903768	A	27-02-1990	CA	2006967 A,C		03-07-1990
US 4166504	A	04-09-1979	BR	7905405 A		29-04-1980
			CA	1102684 A		09-06-1981
			DE	2930143 A		06-03-1980
US 5318124	A	07-06-1994	CA	2055549 A		15-05-1993
			DE	4238247 A		19-05-1993
			RU	2098613 C		10-12-1997

## PATENT COOPERATION TREATY

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## NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

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Assistant Commissioner for Patents  
 United States Patent and Trademark  
 Office  
 Box PCT  
 Washington, D.C.20231  
 ETATS-UNIS D'AMERIQUE

in its capacity as elected Office

Date of mailing (day/month/year) 20 June 2000 (20.06.00)	Assistant Commissioner for Patents United States Patent and Trademark Office Box PCT Washington, D.C.20231 ETATS-UNIS D'AMERIQUE
International application No. PCT/CA99/00996	Applicant's or agent's file reference 1024.106
International filing date (day/month/year) 26 October 1999 (26.10.99)	Priority date (day/month/year) 26 October 1998 (26.10.98)
<b>Applicant</b> GOOD, William, Keith et al	

1. The designated Office is hereby notified of its election made:

 in the demand filed with the International Preliminary Examining Authority on:

24 May 2000 (24.05.00)

 in a notice effecting later election filed with the International Bureau on:

---

2. The election  was was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland	Authorized officer  Manu Berrod
Facsimile No.: (41-22) 740.14.35	Telephone No.: (41-22) 338.83.38

## PATENT COOPERATION TREATY

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2  
REC'D 15 NOV 2000  
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## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 1024.106	FOR FURTHER ACTION	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
International application No. PCT/CA99/00996	International filing date (day/month/year) 26/10/1999	Priority date (day/month/year) 26/10/1998
International Patent Classification (IPC) or national classification and IPC E21B43/24		
Applicant ALBERTA OIL SANDS TECHNOLOGY AND...et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 4 sheets, including this cover sheet.

This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 1 sheets.

3. This report contains indications relating to the following items:

- I  Basis of the report
- II  Priority
- III  Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV  Lack of unity of invention
- V  Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI  Certain documents cited
- VII  Certain defects in the international application
- VIII  Certain observations on the international application

Date of submission of the demand 24/05/2000	Date of completion of this report 13.11.2000
Name and mailing address of the international preliminary examining authority: European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Tompouoglou, C Telephone No. +49 89 2399 2077



INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT

International application No. PCT/CA99/00996

I. Basis of the report

1. This report has been drawn on the basis of (substitute sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments (Rules 70.16 and 70.17).):

Description, pages:

1-8 as originally filed

Claims, No.:

1 with telefax of 25/10/2000

2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- the language of publication of the international application (under Rule 48.3(b)).
- the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- contained in the international application in written form.
- filed together with the international application in computer readable form.
- furnished subsequently to this Authority in written form.
- furnished subsequently to this Authority in computer readable form.
- The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- the description, pages:
- the claims, Nos.:
- the drawings, sheets:

5.  This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT**

International application No. PCT/CA99/00996

*(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)*

**6. Additional observations, if necessary:**

**V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

**1. Statement**

Novelty (N)                    Yes: Claims 1  
                                  No: Claims

Inventive step (IS)           Yes: Claims 1  
                                  No: Claims

Industrial applicability (IA) Yes: Claims 1  
                                  No: Claims

**2. Citations and explanations  
see separate sheet**

**VII. Certain defects in the international application**

The following defects in the form or contents of the international application have been noted:  
**see separate sheet**

**VIII. Certain observations on the international application**

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:  
**see separate sheet**

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/CA99/00996

**POINT V.**

The claim is judged as an unambiguous assembly of its feature i.e. under the assumption that the word "in" (see Point VIII) has been removed.

The preamble of the claim (text preceding the expression "the improvement comprising") corresponds to CA-A-2015460.

The characterising features of the claim solve the problem of optimising the strategy of sequential exploitation of the two sections of a reservoir because they result in the minimum possible loss of heat of the steam. Indeed that fact that the first section is also producing whilst non-condensable gas is injected in it mean that any possible loss of steam of the second section is exploited to the maximum due to the horizontal arrangement of the production and injection wells.

Although this arrangement is known from US-A-5318124, the step of the concurrent injection of the non condensable gas into the first section of the reservoir is not known from this document.

**POINT VII**

Following should have been taken into account:

- Rule 5.1 (a) ii) reference also to US'124 and their disclosure in the description.
- Rule 5.1 (a) iii) PCT: description in conformity with the new claims.

**POINT VIII**

The use of the word "in a method" makes it unclear whether protection is sought for the improvement only or for all the features defined in the claim. Therefore Article 6 is PCT infringed with regard to clarity.

1        THE EMBODIMENTS OF THE INVENTION IN WHICH AN  
2        EXCLUSIVE PROPERTY OR PRIVILEGE IS CLAIMED ARE DEFINED AS  
3        FOLLOWS:

4        1. In a method for recovering heavy oil from an underground reservoir  
5        wherein a first section of the reservoir is at least partially depleted and an  
6        adjoining second section is less depleted, and wherein injected fluid can move  
7        from one section to the other, and wherein a non-condensable gas is injected  
8        into the first section while steam is injected into the second section so that the  
9        pressure in the two sections of reservoir is about equal, the improvement  
10       comprising:

11            the first section has been depleted by practising steam assisted gravity  
12        drainage ("SAGD") using one or more horizontal pairs of injection and  
13        production wells;

14            practising SAGD in the second section using one or more horizontal  
15        pairs of injection and production wells by injecting steam through the injection  
16        wells and producing oil and steam condensate through the production wells;

17            and concurrently injecting the non-condensable gas through the  
18        injection wells of the first section and producing oil through the production  
19        wells of the first section while maintaining the pressure in the two sections of  
20        reservoir about equal.